THE RECENT RACE OF AUTO-MOBILE CARRIAGES IN FRANCE.

Last month a most interesting race of auto-mobile carriages took place in France. The course taken was from Versailles to Bordeaux, and then back to Paris. June 11 was fixed for the day of starting, and forty-six carriages were to have taken part in the race, but only twenty-eight arrived in time, twenty-two of these taking active part, and nine performing the journey within a hundred hours; eight of the latter were worked by petroleum or "gazoline," and one by steam.

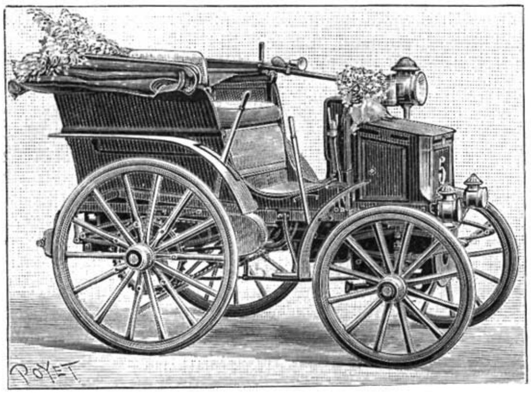

Fig. 1.—No. 5. MM. Panhard and Levassor's carriage, worked by gazoline, and to seat two persons (2nd prize, 12,600 francs). Arrived June 13, at 12.57 a.m.

The accompanying illustrations, which we are enabled to reproduce by the courtesy of the Editor of *La Nature*, are from photographs taken at the exhibition of the carriages on their return. No. 5 (Fig. 1) is the one which was the first to arrive back in Paris. It received the second prize, for it only seats two persons, and a regulation had been made, that no carriage seating less than four persons could receive the first. No. 16 (Fig. 2) really came in fourth, but received the first prize, for on reckoning up the time taken in the journey, it was found to be two minutes less than that taken by No. 8. The third prize was won by No. 15 (Fig. 3).

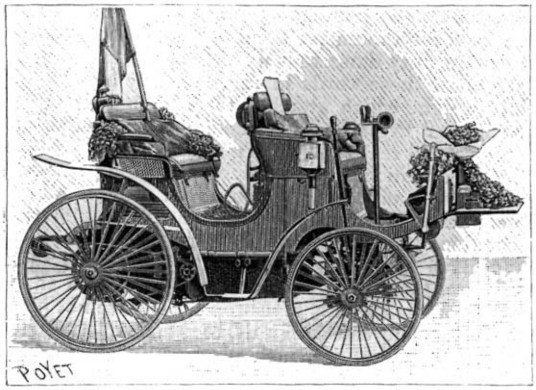

Fig. 2.—No. 16. MM. Peugeot's phaeton, worked by gazoline, and to seat four persons (1st prize, 31,500 francs). Arrived June 14, at 12.2 a.m.

Taking all the facts into consideration, it appears that the lighter carriages travelled best. This proves the advantage of using petroleum or gazoline, for in order to produce one horse-power it requires per hour $1\frac{11}{144}$ lbs. of gazoline, whereas, if it were worked by steam, at least $6\frac{3}{5}$ lbs. of coal and $39\frac{4}{5}$ lbs. of water would be necessary per hour, and if worked by electricity, there would have to be accumulators of the weight of 220 lbs.

Light carriages have many advantages, for besides having to be less careful about the weight of fuel, they can also have lighter constructed wheels. M. Michelin's carriage, with pneumatic tyres, went the whole distance without an accident, whereas the steam vehicles, one and all, had mishaps, owing almost always to their great weight.

It would take up much time and space to relate the many incidents which occurred; suffice it to say that, apart from ordinary breakdowns, in some towns the travellers were hindered by the inhabitants, in others they were enthusiastically pelted with flowers.

These auto-mobile machines are evidently the carriages of the future. According to the *Times* of July 10, a journey has quite recently been performed in our own country by the Hon. Evelyn Ellis, who was accompanied by Mr. T. R. Simms, managing director of the Daimler Motor Syndicate. The carriage is a four-wheeled dog-cart, and will hold four persons, with room also for two portmanteaus. It was built by Messrs. Panhard and Levassor, of Paris, and is worked by petroleum, the cost being about a halfpenny an hour. The journey undertaken by Mr. Ellis, a distance of fifty-six miles, was performed in five hours and a half.

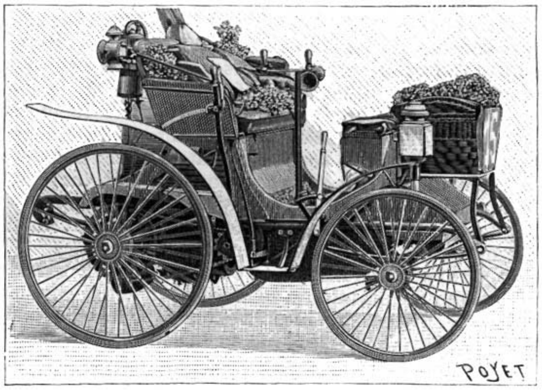

Fig. 3.—No. 15. Worked by gazoline, to seat two persons. Belonging to the sons of Peugeot Brothers (3rd prize, 6300 francs). Arrived June 13, at 6.37 p.m.

We understand that the proprietors of the *Engineer* are offering a prize of £1000 to the maker of the fastest going motor.

W.

NOTES.

We regret to notice that Prof. C. C. Babington, F.R.S., Professor of Botany in the University of Cambridge, died on Monday morning, at the age of eighty-six.

Prof. Ramsay has been elected a Correspondant of the Paris Academy of Sciences, in the Section of Chemistry, and M. Sabatier has been elected a Correspondant of the Section of Anatomy and Zoology.

Mr. H. J. Chaney, of the Standards Department, Board of Trade, will attend the Sexennial Conference of the International Committee on Weights and Measures at Paris, on September 6 next, as the representative of Her Majesty's Government.

Dr. Carl Barus, of the Smithsonian Institution, has, says *Science*, accepted the Hazard Professorship of Physics in Brown University. It is stated that Brown University has recently spent £20,000 in the building and equipment of a physica laboratory.

THE death is announced of Prof. Baillon, Director of the Botanical Laboratory of the Faculty of Medicine at the Sorbonne. Prof. Baillon was one of the most distinguished of French botanists, and perhaps quite the most prolific author of works in that science of the last quarter of a century. The *Times* gives the following details of his life. He was born at Calais, November 30, 1827, and was destined for the medical profession. He prosecuted his studies at Paris, and soon obtained prizes for work in "L'École Pratique," and in the hospitals. In 1855 he received the double degree of doctor of medicine and of the natural sciences. In 1864 he was appointed Professor of Medical Natural History to the Faculty of Paris, and soon afterwards Professor of Hygiene to the Central School of Arts and Manufactures. He was decorated with the Légion d'Honneur on August 17, 1867, and promoted to Officer July 13, 1888. His chief publication was "Histoire des Plantes," a vast undertaking, in twelve fully-illustrated volumes, the publication of which commenced in 1866, and concluded only three years ago. It has been partly translated into English. His next great work was a "Dictionnaire de Botanique," which he begun in 1876; the first volume appeared in 1878, and the fourth in 1885. He also published a number of monographs and studies on various natural orders and groups of plants.

MR. W. N. MOORE has succeeded Prof. Mark W. Harrington as Chief of the U.S. Weather Bureau.

MR. O. A. L. PIHL, whose careful measurements of the stars in the cluster χ Persei are well known in astronomical circles, has just died at Christiania.

PROF. J. G. AGARDH has presented his fine collection of dried algæ to the University of Lund, on the condition that it remains there intact, and the specimens not be lent out.

MR. CHARLES LEIGH, assistant in the General Library of the Natural History Museum, South Kensington, has been appointed to the post of assistant secretary and librarian to the Manchester Literary and Philosophical Society, created under the Wilde Endowment Fund.

A SHARP earthquake shock was felt at Algiers at 11.25 on the night of Friday last, July 19. The direction of motion is said to have been from west to east.

THE National Herbarium of the United States at Washington has been transferred from the building of the Department of Agriculture, and now forms a part of the National Museum in the Smithsonian Institution. The collection of grasses remains, however, with the Department of Agriculture, as also do the collections of the Divisions of Vegetable Pathology and Forestry. A movement is now on foot among American botanists for providing the National Herbarium with a suitable building and a staff of scientific assistants.

THE adjudicators appointed under the provisions of the deed of settlement of the Daniel Hanbury Memorial Fund have, says the *Pharmaceutical Journal*, awarded the eighth Hanbury Gold Medal to Dr. August Vogl, Professor of Pharmacology and Pharmacognosy in the University of Vienna. The medal is awarded biennially for the prosecution or promotion of original work in the chemistry and natural history of drugs. On the last occasion, in 1893, it was awarded to the late Johann Michael Maisch, who received it just before his death.

THE following grants have been made by the Council of the Chemical Society on the recommendation of the Research Fund Committee:—£30 to Messrs. J. J. Hummel and A. G. Perkin, for the investigation of certain natural colouring matters. £10 to Dr. H. Ingle, for the purchase of various aldehydes, ketones, and hydrazine, to continue his work on stereoisomeric osazones. £10 to Dr. J. J. Sudborough, to continue his work on diortho-substituted benzoic acids. £15 to Mr. E. Haworth, for the synthesis of an acid having the composition $C_8H_{14}(COOH)_2$, and the comparison of its properties with those of camphoric acid. £5 to Mr. R. E. Doran, for a research on the preparation of mustard oils by the reaction of chlorocarbonic esters with lead thiocyanate. £15 to Dr. W. A. Bone, to continue a research on the substituted succinic acids, and on the behaviour of various trimethylene compounds on treatment with the sodium compound of ethylic malonate. £10 to Dr. B. Lean, to extend his work on the derivatives of ethylic butane tetracarboxylate. £20 to Dr. J. Walker, for an investigation of the conditions of equilibrium between the cyanates and the corresponding ureas.

MR. W. SAVILLE-KENT, who has recently returned from Western Australia, has presented and otherwise placed at the disposal of the Trustees of the British Museum a further collection of Madreporarian corals and sponges collected by him on the north-western coast-line of the above-named colony. The series includes many new species and specimens calculated to prove attractive exhibits in the public galleries. With this latest addition included, the Natural History Museum becomes possessed of the most complete collection of Australian Madreporaria that has yet been brought together, and which now comprises typical examples collected by the same authority from every region of the extensive coral-producing waters of the Australian continent. Mr. Saville-Kent will probably be engaged for the next few months in the compilation of a book dealing generally with the more interesting natural history observations and investigations he has recorded and prosecuted during the past ten years while holding the appointments of Commissioner of Fisheries to the several Governments of Queensland, Tasmania, and Western Australia.

BY the provisions of the will of the late Dr. William Johnson Walker, two prizes are annually offered by the Boston Society of Natural History for the best memoirs written in the English language on subjects proposed by a Committee appointed by the Council. For the best memoir presented, a prize of sixty dollars may be awarded; if, however, the memoir be one of marked merit, the amount may be increased to one hundred dollars, at the discretion of the Committee. For the next best memoir, a prize not exceeding fifty dollars may be awarded. The competition for these prizes is not restricted, but is open to all. Attention is especially called to the following points:—(1) In all cases the memoirs are to be based on a considerable body of original and unpublished work, accompanied by a general review of the literature of the subject. (2) Anything in the memoir which shall furnish proof of the identity of the author shall be considered as debarring the essay from competition. (3) Each memoir must be accompanied by a sealed envelope enclosing the author's name and superscribed with a motto corresponding to one borne by the manuscript, and must be in the hands of the Secretary on or before April 1 of the year for which the prize is offered. The subjects for 1896 are:—(1) A study of an area of schistose or foliated rocks in the eastern United States; (2) a study of the development of river valleys in some considerable area of folded or faulted Appalachian structure in Pennsylvania, Virginia, or Tennessee; (3) an experimental study of the effects of close-fertilisation in the case of some plant of short cycle; (4) contributions to our knowledge of the general morphology or the general physiology of any animal, except man. The subjects for 1897 are:—(1) A study of glacial, fluviatile, or lacustrine phenomena associated with the closing stages of the glacial period; (2) original investigations in regard to the chalazal impregnation of any North American species of Angiosperms; (3) an experimental investigation in cytology; (4) a contribution to our knowledge of the morphology of the Bacteria.

REPORTS upon the circumstances attending an explosion which occurred in the Timsbury Colliery last February, prepared by Mr. J. Roskill and Mr. J. S. Martin, have just been published in a Blue Book. The explosion is interesting because fire-damp is practically unknown in the colliery. In this colliery, as throughout the Radstock series of the Somersetshire coalfield, naked lights are used; it is exempted from the application of the section of the Rule which prohibits explosives being taken down in mines except in cartridges, and gunpowder alone is used for blasting. It is evident from the inquiry that this exemption should be cancelled, and Mr. Roskill recommends that the use of gunpowder, except in cartridges, should be prohibited. Although before the explosion parts of the colliery were known to be dry, while more or less dust occurred in places, yet the mine was not regarded as a "dry and dusty mine." Judging from the explosion, however, the mine should come within that category. The explosion occurred at a spot which was apparently not dry and dusty within the meaning of the Act; but it was, if not caused, certainly intensified, by the presence of dust at much greater distances than twenty yards from the spot, though the Rule relating to shot-firing in a dry and dusty place, only prescribes watering within a radius of twenty yards. The moral drawn from the disaster is (1) that roburite, or one of the so-called flameless explosives, should, in future, be used instead of powder, and (2) that when places in a mine are admittedly dry and dusty, every place in the mine should be considered to be so, for the purpose of shot-firing, in order to make it imperative that, in such mines, the precautions prescribed by General Rule 12 should be observed in *all* places of firing.

WE have received a copy of the Report of the Epping Forest Committee presented to the Court of Common Council on June 13, of the present year, and containing the memorials which were reprinted in these columns a short time ago (June 13, p. 158). In presenting the Report the chairman, Mr. Deputy Halse, said that "if the action of your Committee were judged alone by the weight of authority attaching to those who have expressed themselves to be so entirely in accord with the past management of the Forest, a complete answer to the charges has already been made; but we prefer to await and present to your Honourable Court the Report of the eminent experts in Forestry whom we consulted last year, and by whose opinion and decision we are perfectly prepared to be judged and bound" We understand that the Committee of experts visited the Forest last week, and their judgment will be awaited with interest. Nothing could, however, strengthen the hands of the Committee more than the memorials which are now made public with their attached signatures. The value of the Report from a public point of view is greatly enhanced by a set of photographs reproduced from the illustrations in one of the daily papers, and placed opposite the views of the actual places which the newspaper artist is supposed to have represented. The article from the paper itself is reprinted *in extenso*, with a note stating that "the above article was accompanied by the illustrations reproduced on the annexed photographic sheet. Its accuracy may be judged from the photographs of those portions of the Forest so professed to be illustrated, which were taken within two days of the appearance of the article." The absurdity of the clamour, which is raised year after year by a small and irresponsible body of agitators, is well brought out by the article and its illustrations thus confronted with the true representations. Any paper that lends itself in future to such perversions will justly forfeit public confidence. The keen interest taken by the people in the management of Epping Forest is a very healthy sign, but the case against the present Conservators must indeed have been feeble if it was found necessary to resort to such pictorial artifices as are exposed in the Report issued by the Common Council.

UNSETTLED weather has prevailed in most parts of the British Islands during the last week, and thunderstorms have occurred in various places, while falls of rain exceeding an inch in twenty-four hours have been recorded on several days. In London, there were two distinct thunderstorms on Sunday last, one of which, between two and three p.m., was accompanied by an exceptionally heavy fall of hail. The amount of rain in London on that day was about 1·3 inch, which is the heaviest fall in twenty-four hours since last October.

AT the recent meeting of the Australasian Association for the Advancement of Science at Brisbane, Mr. C. L. Wragge proposed the erection of a meteorological station on Mount Wellington, Hobart. The proposal was supported by Mr. H. C. Russell, Government Astronomer of New South Wales, and by the Royal Society of Tasmania, in consequence of which the Government voted the necessary funds. An experimental station has just been established by Mr. Wragge on the summit of the mountain at a height of 4166 feet above sea-level, and a permanent observatory-house is now in course of erection. There are also corresponding stations at the Springs (2495 feet), and at Hobart (160 feet); we have no doubt, therefore, that results of importance will be derived from them. Mount Wellington is about four miles distant from Hobart, in a straight line, and rises almost directly from the level of the sea; it consequently offers considerable advantages for meteorological research.

THE Pilot Chart of the North Atlantic Ocean for July contains monthly charts, representing graphically the regions where fog was experienced most frequently on the North Atlantic during 1894. As this year can be taken as a typical one to illustrate the distribution at different seasons, it is interesting to note that during the first three months of the year fog is experienced on the Grand Banks and to the westward, but not in large quantities. During April it begins to extend to the northward and eastward, increasing in frequency as the spring advances, and reaching its maximum, generally, in June or July, during which months it may be expected anywhere between the American coast and this country in large areas and of long duration. In August the fog begins to dissipate in the eastern part of the ocean, and in September the decrease is very perceptible. During the remaining three months the charts show that it reaches its minimum again, and is mostly restricted to the westward of 40° west longitude.

SOME brief telegrams in the daily papers announced the occurrence of an earthquake in the Meshed district of Persia on January 17, but gave little indication of its destructive character. The centre of the earthquake appears to have been near Kúchán, a town which has been damaged or destroyed by earthquakes several times during the present century, the last occasion being in 1893, when it was completely reduced to ruins. After this the town was rebuilt on the old site, but the houses were made very largely of wood. At the beginning of this year, the new town contained about 2000 houses and 8000 inhabitants. On January 17, shortly before noon, another disastrous earthquake occurred. It lasted about a minute, and the shock was so severe that it completely destroyed every house in the town, with the exception of a few small shanties. The wooden pillars of the better-built houses were all broken in the middle. Numbers of people were buried in the ruins, but, owing to the lightness of the materials, the loss of life was much less than it would otherwise have been. The local authorities estimated the number of deaths from two to six thousand, but the careful inquiries of an attaché at the British Consulate-General at Meshed have reduced this figure to abou

700. Orders have been issued by the Persian Government for the town to be rebuilt near Hai Hai, a place six or seven miles to the south-east, which experience has shown to be safe from destructive shocks.

THE history of the Russian Biological Station, on the island of Solowetzk in the North Sea, has already been given in our columns (NATURE, November 1894, p. 83). One of the most interesting of the results achieved by the naturalists of the laboratory has been the discovery of a remarkable lake on the island of Kildine in the Arctic Ocean. This lake, which is completely separated from the sea by a narrow strip of land, was discovered by the Russian naturalist, M. Herzenstein, who was struck by finding in the lake a fish which is exclusively marine in habit, namely the common cod. Further observations by MM. Faussek and Knipowitsch have elucidated the peculiar features of the fauna of the lake. On the surface the water is fresh, and is inhabited by fresh-water animals, such as Daphnids, &c.; this water is brought to the lake by streams from a neighbouring marsh. Under the superficial layer of fresh water is found salt water, supporting a Marine fauna—Sponges, Sea-anemones, Nemertines, Polychætes, marine Molluscs (*Chiton*, *Æolis*, *Astarte*), Starfish, and Pantopods. There is even a regular littoral zone beneath the fresh water, characterised by small *Fuci*. The bottom of this lake is covered with mud exhaling an odour of sulphuretted hydrogen, and is not inhabited. The water of the lake shows a slight ebb and flow, attaining a vertical height of only a few inches, while the tides in the adjacent sea are considerably greater. This fact would appear to point to the existence of some subterranean communication between the lake and the sea.

SOME important additions to a knowledge of the latest Mesozoic and early Tertiary mammalia have recently been made from Patagonia and the Uinta Basin. From the former place a collection of ungulates of very late Cretaceous date is described by Señor F. Ameghin in the *Bol. Inst. Geografico Argentino*, t. xv., 11 and 12. The most important is a new genus, *Pyrotherium*, which is made the type of a new sub-order, regarded as ancestral to the Proboscidea, and showing marsupial affinities. A number of other new genera are also described, and it is anticipated that when the fossil localities, which are very difficult of access, have been more fully investigated, still more valuable information on the late Mesozoic mammalia will be obtained. Large Dinosaurs and birds also occur in these beds.

PROF. H. F. OSBORN reports in the *Bull. Amer. Mus. Nat. Hist.*, New York, vol. vii., art. 2, on a more extensive collection than has hitherto been obtained from the Eocene beds of the Uinta Basin. Beneath the true Uinta fauna comes one which is intermediate between it and the Bridger and Washakie faunas, and thus supplies a most important link in the faunal succession of this province, while at the same time it shows affinities to the Miocene fauna of the White River. Among the mammalia found in this transitional fauna are a monkey, and species of *Telmatotherium*, which definitely confirm the view that that genus was ancestral to the Titanotheria. It is expected that still more valuable results may be got from a more thorough exploration that is being made this year.

THE application of electricity to locomotion has recently made notable progress in the United States. At a trial of electric motors at Nantasket Beach, near Boston, a few days ago, it is stated that a speed exceeding sixty miles an hour was attained; and the experiment demonstrated the utility of this motor for suburban traffic. The system went into practical and regular operation on the Nantasket Beach Railway at the end of June. A successful test has also been made at Baltimore of the electric locomotive designed to draw trains through the tunnel, 7430 feet long, in that city. This and its companion—the first locomotives of the kind ever built—have each two trucks and eight wheels, sixty-two inches in diameter. Flexibly supported on each truck are two six-pole gearless motors, one for every axle. A maximum speed of fifty miles an hour is to be developed, and it is guaranteed that the locomotive will pull 1200 tons at a speed of thirty miles an hour. When coupled to a six-wheel New York Central locomotive, the electric locomotive pulled it up and down the track at will, against the pull of the steam locomotive.

AT a recent meeting of the Société Française de Physique, M. Pierre Weiss gave an account of the results of his experiments on the aelotropic magnetic properties of crystallised magnetite. The magnetisation curve of magnetite crystallised in the cubic system presents the same general features as those of iron, nickel and cobalt. The magnitude of the magnetisation (*i.e.* the permeability), however, varies with the inclination of the magnetising field to the crystallographic axes. Experiments have been made by a ballistic method suitably modified so as to permit of observations being made on very small specimens. The results thus obtained have been confirmed by other experiments in which a small disc of magnetite was rotated in a strong magnetic field, and the variations in the induction measured by means of a small coil surrounding the disc and connected to a ballistic galvanometer. The discs examined were cut parallel to the faces of the cube, octahedron and rhombic dodecahedron. If the results are expressed by drawing radii vectores from a given point of such length that they represent the magnetisation of the specimen in that direction when saturated, the surface which contains the ends of all these radii vectores is a cube with rounded edges, and with its faces slightly hollow. The magnetisation is the same in all directions contained in a plane parallel to one of the faces of the octahedron, so that the above-mentioned surface is cut by such a plane in a circular section. An experiment illustrating this aelotropic property of magnetite was shown before the Society. A small disc of magnetite placed on a plate of glass between the poles of a strong electro-magnet, turned so that one of its axes of maximum permeability was parallel to the field. Besides the difference which these experiments show between a body crystallised according to the cubic system and an isotropic body, they also show that the theories which regard magnetisation as resulting from the orientation of particles of fixed magnetic moment are insufficient to explain the magnetisation of crystalline bodies.

DURING his recent visit to the Algerian Sahara, M. Janssen made some decisive observations concerning the absorption bands near the D line of the solar spectrum, supposed to be due to atmospheric oxygen. The object was to test whether these absorption bands correspond to those observed on transmitting white light through a tube containing condensed oxygen. In some previous experiments on this question, M. Janssen had obtained these bands by means of a tube 60 m. long, containing oxygen compressed up to 6 atmospheres. An account of the Sahara observations is given in the *Comptes rendus*, together with a theoretical investigation concerning the equivalent height of the atmosphere. Starting with the remarkable law discovered by M. Janssen that the absorptive power of a gas is proportional to the thickness traversed and to the square of the density, the integration of the different layers of the atmosphere with their different densities gives 3981 m. as the equivalent thickness for a vertical ray of light. But since the density of oxygen is only 0·208 of that of the atmosphere, this number must be multiplied by 0·043, the square of that density. This gives 172 m. as the equivalent thickness of the oxygen layer. This thickness, at a pressure of one atmosphere, would not be sufficient for showing the absorption bands, and this accounts for their absence when the sun is high in the heavens. But as the sun sets, the thickness of air traversed by its rays increases, and at an altitude of 4° the conditions are the same as those in the 60 m. tube at 6 atmospheres pressure. At this altitude they do in fact appear, and the excessive dryness of the desert air precludes the possibility of their being due to water vapour. Thus both the terrestrial origin of these oxygen bands, and also the validity of Janssen's law of absorption, have received a striking confirmation.

THE fifth volume of the *Geographical Journal*, comprising the numbers issued during the first six months of this year, has just been published.

WE have received the Report for the year 1894-95 of the Royal Garden, Calcutta, by the Curator, Dr. G. King, issued by the authority of the Government of Bengal. It reports a considerable amount of work done in the improvement of the Gardens, and especially in the increase and arrangement of the Herbarium.

THE number of periodicals, both in Europe and America, dealing with electrical matters is considerable, the last addition to the list being the *Electrical Journal*, a new monthly published in San Francisco. The first number contains a long account of the "Express" system of telephone switchboard. Other articles appearing deal with the efficiency of electric plants, the electrical installation on board the cruiser *Olympia*, and the field of operations of an electrical engineer.

THE volume containing the *Proceedings* of the American Association for the Advancement of Science at the forty-third meeting, held at Brooklyn last August, has lately been issued. As we gave at the time a report of the work of the Sections, and printed some of the presidential addresses in full, it is only necessary for us now to say that the volume is very well produced, and contains many very valuable papers.

THE fourth and apparently concluding volume of the *Seismological Journal of Japan* has recently been published. It consists of a very valuable paper of nearly 400 pages, by Prof. Milne, "A Catalogue of 8331 Earthquakes recorded in Japan between 1885 and 1892." The materials were obtained from 968 stations, distributed over the whole empire, the total number of documents being perhaps not less than eighty or a hundred thousand. In the first catalogue are given for each shock the time of its occurrence, the land-area shaken, and data by which the position of the epicenter and the boundary of the disturbed area are approximately determined. The second catalogue states the seismic district to which each shock belongs, the lengths of the axes of the disturbed area in tens of miles, from which the total area can be roughly ascertained, and, when the shock is submarine, the distance of the epicenter from the shore. The chief object of the paper is to provide trustworthy materials for future investigations, but some results have been already obtained and are briefly described. Prof. Omori's work on after-shocks has been referred to in a previous number (vol. li. p. 423). The distribution of earthquakes in Japan forms perhaps the most important section. Earthquakes, it appears, are singularly rare in the central parts of the country, which includes the mountainous districts where active volcanoes are numerous. The majority of shocks originates along the eastern coast of the empire, and many are of submarine origin. A large number seem to start from the face of the steep monoclinal slope which Japan presents towards the Pacific Ocean. Earthquakes are numerous where the slope is steep, and rare where it is comparatively gentle (see pp. 201-2). They are frequent in those districts where movements of secular elevation or depression are now taking place. Earthquake-sounds are often heard, but more so in the rocky mountainous districts than on alluvial plains. At the close of the paper is given a list of 301 seismic disturbances observed from 1889 to 1893 in Europe and at Teneriffe with the horizontal pendulum of Dr. von Rebeur-Paschwitz. Seven of these disturbances, and possibly five others, correspond to earthquakes in Japan.

THE flora of the Caucasus has lately been the subject of several interesting explorations and speculations by Russian botanists. The old data, contained in the works of Boissier and Ledebour, are now of little value, on account of the too broad remarks concerning the distribution of the different species, such as *Caucasus*, *provinciæ Caucasicæ*, and so on, which one finds in these otherwise classical works. On the other hand, such recent explorers as N. Kuznetsoff and A. Krasnoff, who have paid great attention to the composition of the floras of different parts of Caucasia, and their probable origin, have rather raised a series of most important geo-botanical questions than solved them definitively; while MM. Lipsky, Alboff, and Akinfieff have devoted their chief attention to the collection of positive systematic data, with exact indications relative to the distribution of different species. We have now in the "Memoirs (Trudy) of the Kharkoff Naturalists" (vol. xxvii.) a first instalment, by the last-named botanist, of a detailed list of plants in the middle parts of the Caucasus main ridge, with full indications concerning their vertical and horizontal distribution. Considering the generalisations of M. Kuznetsoff and M. Krasnoff as premature under our yet imperfect knowledge of the orography and geology of Caucasia, M. Akinfieff only ventures to formulate a few conclusions; namely, that the flora of Colchida is the youngest in Caucasia, as it has the least number of species, and especially of endemic forms, and that it contains but a small part of what constitutes the Mediterranean flora, as well as very little of what is found in other parts of Caucasia. The flora of Daghestan, Asiatic in its origin, has, on the contrary, in its steppe, sub-Alpine and Alpine representatives, a wide distribution over all Caucasia, with the exception of Colchida; four-fifths of the surface of Caucasia are thus genetically connected for their flora with Asia, and one-fifth only with Europe, the boundary between the two being, not the main ridge, but a broken line running approximately from Stavropol, or rather north of this town, along the water-parting between the Kuban and the Terek, to the Elborus, along the main ridge to the Adai-khokh, and further to the Mesques Mountains and the Suram Pass. It should be said that this conclusion seems to agree very well with what we now learn about the orgraphical structure of Caucasia, from which it appears more and more that the Mesques Mountains must be considered as a continuation of the border-ridge of the Asia Minor plateau, which ridge runs along the south-eastern coast of the Black Sea, and is continued north-east to meet the main ridge.

WE have received from Dr. Doberck, Government Astronomer of Hong Kong, the report of that observatory for 1894, containing *inter alia* an account of nineteen typhoons which occurred during the year, and the paths of which have been laid down on two plates. Information regarding storms is regularly exhibited and telegraphed whenever they can be justified by the observations received, but the work is apparently much interfered with by the tardy arrival of telegrams from the outlying stations. For the purpose of elucidating the behaviour of typhoons and other meteorological features, observations are regularly extracted from the logs of ships which visit the China seas, and tabulated for future use; in addition to these, observations are received from about forty land stations. The astronomical and magnetical work of the observatory has been regularly carried on, as in former years.

WHEREAS a few years ago the discovery of a new spirillum form was hailed as a bacteriological novelty, we are now constantly receiving fresh additions to this interesting group of microbes. With improved methods their detection and isolation have been rendered comparatively easy, and they are now found fairly widely distributed in water. Sanarelli isolated no less than thirty-two different vibrios from the river Seine, sewage-effluent, and pond water, and various authorities in Germany have detected such forms in rivers. So far the larger number have been obtained from river water, and have been but rarely met with in well water; but quite recently MM. A. Zawadzki and G. Brunner, of the Imperial Institute for Preventive Medicine in St. Petersburg, have discovered and isolated three vibrios from polluted well water, which do not liquefy gelatine, and in other respects are easily distinguishable from Koch's cholera vibrio. As regards their pathogenic properties, it is stated that white mice were quite unaffected when the vibrios were subcutaneously introduced. The investigations and descriptions have been carefully done and are fully recorded, and the authors are persuaded that they have discovered new forms. It is, however, difficult to decide this point, for only a slight acquaintance with the literature of the subject is apparent; and whilst the authors complain that Eisenberg's catalogue of bacteria is out of date, and those of Roux and Lustig are respectively incomplete, they do not appear to have any acquaintance with Percy Frankland's "Micro-organisms in Water," containing descriptions of over 200 bacteria found in water, neither have they consulted many important memoirs on vibrios which have been published in recent German and French journals.

THE writer of the note on p. 277, referring to hygrometric observations on the Sonnblick mountain, inadvertently wrote, "atmospheric electricity," instead of "atmospheric humidity, in the second line of the note.

THE additions to the Zoological Society's Gardens during the past week include a Mozambique Monkey (*Cercopithecus pygerythrus*) from East Africa, presented by Mrs. A. Canning Fysh; a Rhesus Monkey (*Macacus rhesus*) from India, presented by Mr. A. Kagele; an Irish Stoat (*Putorius hibernicus*) from Ireland, presented by the Viscount Powerscourt; a Suricate (*Suricate tetradactyla*) from South Africa, presented by Miss Dorothy Lowndes; a Bosch-bok (*Tragelaphus sylvaticus*) from South Africa, presented by Mr. W. Champion; six Orbicular Horned Lizards (*Phrynosoma orbiculare*) from Mexico, presented by Mr. E. J. Scarbrough; a West African Python *Python sebæ*) from West Africa, presented by Mr. Edward Straw; a Red-sided Tit (*Parus varius*) from Japan, a White-browed Amazon (*Chrysotis albifrons*) from Honduras, two Adorned Terrapins (*Clemmys ornata*) from Central America, deposited; a Japanese Deer (*Cervus sika*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

ALTITUDE AND AZIMUTH OF POLARIS.—It is a matter of common knowledge that the Pole star is about a degree and a quarter from the true pole, so that azimuths and latitudes cannot be directly determined by observations of this star. The usual mode of procedure is to employ tables reducing the observations to the true pole; a graphical method of performing this rather tedious reduction, with an accuracy sufficient for most purposes, has been devised by A. Tanakadate, of Tokio (Sūgakub.-Kizi.) It is shown that the usual formula for the calculation of azimuth corresponds very nearly with the equation of a circle of radius $p \sec \phi$ (p being the polar distance of Polaris, and ϕ the latitude of the place of observation), and the centre of which is displaced above the origin by an amount equal to $\frac{p^2 \tan \phi}{\cos \phi}$. An origin being chosen near the middle of a sheet of squared paper, degrees and minutes are marked off along the axes in both directions, and a circle is drawn on the same scale with radius and displacement of centre adapted to the latitude as defined above. Radiating straight lines drawn from the origin correspond to different hour angles, the line $t=0$ being that along which the centre of the circle is displaced. The abscissa of the point where the line corresponding to the hour angle at which an observation is made cuts the circle, gives directly the azimuth of Polaris, the star being east or west of the true north according as the point lies to the right or left of the origin in the diagram. Neglecting errors of construction, the readings will only differ by a few seconds from the calculated results, and it is shown that even these errors can be reduced by slightly enlarging the radius of the circle.

If a circle be drawn from the origin as centre, with radius equal p, the diagram can also be used for reducing the latitude from observations of the Pole star by giving a small correction to the hour angle, $\frac{1}{2}\, p \tan h \sin t$, where h is the observed altitude, and t the hour angle. The ordinate of this circle gives the correction to be applied to the observed altitude in order to obtain latitude.

It is pointed out in the paper that these principles may easily be embodied in an instrument, and, in fact, such a contrivance is now in use among the students of astronomy in the Imperial University.

OBSERVATIONS OF DOUBLE STARS.—The measurements of position angles and distances of double stars made at the Paris Observatory from July 1890 to the end of last year, are published by M. Bigourdan in a very concise form in the *Bulletin Astronomique* for July. The telescope employed was that of the western tower, having an object glass 0·305 m. diameter and a focal length of 5·25 m., the magnifying power usually being 478. Most of the observations were made in the twilight or in the early night, at which times the star images are at their best. The list of stars observed includes about 150 from the Dorpat catalogue, 76 from the Pulkowa catalogue, and nearly 30 others; in many cases there are long series of measures of the same pair. A filar micrometer was employed.

At the Berlin Observatory, Dr. V. Knorre has used a double image micrometer in the measurement of double stars, and some of the results are given in *Ast. Nach*, 3300. The measures appear to agree very well with those of M. Bigourdan, in the case of stars common to the two sets of observations.

A GREAT NEBULA IN SCORPIO.—In the course of his work on the photography of the Milky Way, Prof. Barnard exposed a plate on the region near Antares for 2h. 20m. on March 25, 1895. The resulting negative showed a vast and magnificent nebula, intricate in form, and apparently connected with many of the bright stars of that region, including Antares and σ Scorpii. The nebula is gathered in cloud-like forms, the greatest masses being around ρ Ophiuchi and two neighbouring small stars. This photograph was taken with the Willard lens of 6 inches aperture, with which Prof. Barnard has previously obtained such splendid results.

Even more interesting is a photograph of the same region taken with a "lantern lens" of 1½ inches aperture and 5 inches equivalent focus, the exposure being 2h. 18m. The scale of this photograph is about 10° to the inch, and in addition to bringing out some new points about the great nebula, it shows the sky itself in that region to be very wonderful. The first photograph had shown that the nebula occupied a singularly blank part of the sky, from which large vacant channels diverged towards the east, and the negative taken with the lantern lens showed that these channels ran irregularly eastward for 15° or 20°.

The photograph taken with the lantern lens shows that the new nebula extends southward for two or three degrees beyond Antares and σ Scorpii in a southward direction. An elongated nebula about 2° or 3° long, involving the star ν^2 Scorpii, is also seen on the photograph.

Prof. Barnard goes on to say that "this magnificent nebula is one of the finest in the sky, and as it involves so many of the bright stars in that region it would imply that they are essentially at the same distance from us." (*Ast. Nach.* 3301). The unpretentious character of one of the instruments employed by Prof. Barnard is not the least remarkable feature about this new discovery.